

IN THE CLAIMS

1. (Currently Amended) A method for analysis comprising:

~~transmitting~~ electromagnetic radiation of a predetermined wavelength range through a first structure substantially transmitting with respect to said electromagnetic radiation, said first structure comprising a substantially transparent substrate carrying a plurality of spaced-apart metallic islands ~~detecting a transmission of said electromagnetic radiation~~ through said first structure, and generating a first measurement indicative of a response of said first structure to said electromagnetic radiation, said first measurement being representative of a surface plasmon absorption of said first structure;

adsorbing a chemical substance onto said plurality of metallic islands so as to produce a second structure ~~substantially transmitting~~ with respect to ~~said electromagnetic radiation~~ and having a second different plasmon absorption characteristic, said second structure comprising a chemical substance-metallic islands moiety on said transparent substrate, transmitting the electromagnetic radiation through said second structure, detecting transmission of said second structure to said electromagnetic radiation, and generating a second measurement indicative of a response of said second structure to said electromagnetic radiation, the second measurement being representative of the surface plasmon absorption of said second structure; and

comparing said first and second measurement of the surface plasmon absorption of the first and second structures, respectively, to detect a difference therebetween to provide at least one of a quantitative indication and a qualitative indication of at least one of the following: said chemical substance-metallic islands moiety, a functionality of said chemical substance-metallic islands moiety, said plurality of metallic islands, a functionality of said plurality of metallic islands, said chemical substance and a functionality of said chemical substance.

2. (Previously Presented) A method according to claim 1, and wherein said adsorbing said chemical substance comprises producing at least one of the following interactions between the chemical substance and said plurality of metallic islands: a hydrogen bond, an ionic bond, a covalent bond, a Van der Waals force, an electrostatic force and a physical force.

3. (Previously Presented) A method according to claim 1, wherein said transmitting electromagnetic radiation through said plurality of metallic islands comprises transmitting electromagnetic radiation in the ultraviolet/visible/infra-red range.
4. (Previously Presented) A method according to claim 1, and wherein said transmitting electromagnetic radiation through said plurality of metallic islands comprises transmitting electromagnetic radiation in the range of 300-1100 nm.
- 5 (Previously Presented) A method according to claim 1, and wherein said transmitting electromagnetic radiation through said chemical substance-metallic islands moiety comprises transmitting electromagnetic radiation in the ultraviolet/visible/infra-red range.
6. (Previously Presented) A method according to claim 1, and wherein said transmitting electromagnetic radiation through said chemical substance-metallic islands moiety comprises transmitting electromagnetic radiation in the range of 300-1100 nm.
- 7.(Previously Presented) A method according to claim 1, and wherein said transmitting electromagnetic radiation through said plurality of metallic islands includes transmitting electromagnetic radiation through said transparent substrate comprising at least one of the following: glass, plastic, polystyrene, a polymeric material, an inorganic oxide, quartz and mica.
- 8.(Previously Presented) A method according to claim 1, and wherein said transmitting electromagnetic radiation through said plurality of metallic islands includes transmitting electromagnetic radiation through said transparent substrate having a thickness of up to 5 mm.
9. (Previously Presented) A method according to claim 1, and wherein said transmitting electromagnetic radiation through said plurality of metallic islands includes transmitting

electromagnetic radiation through metallic islands comprising at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

10.(Original) A method according to claim 1, and wherein said metallic islands are gold islands.

11. ((Previously Presented) A method according to claim 1, and wherein said transmitting electromagnetic radiation through said plurality of metallic islands includes transmitting electromagnetic radiation through metallic islands having a thickness of up to 400 engstrom units.

12. (Original) A method according to claim 11, wherein the thickness is between 10 to 100 engstrom units.

13. (Previously Presented) A method according to claim 1, and wherein said employing comprises measuring a change in a surface plasmon absorbance of said plurality of metallic islands.

14. (Currently Amended) A method according to claim 1, and wherein each of said ~~first optical property measurement and said second optical property measurement~~ first and second measurements comprises a peak of maximal absorbance.

15. (Cancelled)

16. (Currently Amended) A method according to claim 1, and wherein each of said ~~first optical property measurement and said second optical property measurement~~ first and second

measurments comprises an absorbance of said chemical substance-metallic islands moiety at a specific wavelength.

17.(Currently Amended) A method according to claim 1, and wherein each of said generating a first optical property measurement and said generating a second optical property measurement first and second measurements comprises performing real-time measurements ~~of said optical property of said chemical substance-metallic islands moiety.~~

18 (Cancelled)

19. (Currently Amended) A method according to claim 1, and wherein each of said ~~generating a first optical property mesasurement and said generating a second optical property measurement~~ first and second measurements comprises performing continuous measurements.

20. (Currently Amended) A method according to claim 1, and wherein each of said ~~generating a first optical property mesaruegment and said generating a second optical property measurement~~ first and second measurements comprises performing kinetic monitoring.

21. (Original) A method according to claim 1, and further comprising producing the plurality of metallic islands on the transparent substrate.

22. (Previously Presented) A method according to claim 21, and wherein said producing said plurality of metallic islands includes producing said plurality of metallic islands from at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

23. (Previously Presented) A method according to claim 21 and wherein producing said plurality of metallic islands comprises evaporating said plurality of metallic islands.

24 (Previously Presented) A method according to claim 21 and wherein producing said plurality of metallic islands comprises sputtering said plurality of metallic islands.

25. (Previously Presented) A method according to claim 21 and wherein said producing said plurality of metallic islands comprises electroless deposition of said plurality of metallic islands.

26 (Previously Presented) A method according to claim 21 and wherein said producing said plurality of metallic islands comprises electrolytic deposition of said plurality of metallic islands.

27. (Previously Presented) A method according to claim 21 and wherein said producing said plurality of metallic islands comprises hot-melt deposition of said plurality of metallic islands.

28. (Original) A method according to claim 1, and further comprising annealing said plurality of metallic islands on said transparent substrate.

29. (Previously Presented) A method according to claim 28, wherein said annealing is performed prior to said adsorbing said chemical substance onto said plurality of metallic islands.

30. (Previously Presented) A method according to claim 28 and wherein said annealing said plurality of metallic islands on said transparent substrate comprises heating said plurality of metallic islands on said transparent substrate for up to 24 hours at up to 400 °C.

31. (Previously Presented) A method according to claim 28 and wherein said annealing said

plurality of metallic islands on said transparent substrate comprises heating said plurality of metallic islands on said transparent substrate for up to 4 hours at up to 350 °C.

32. (Cancelled)

33. (Currently Amended) A method according to claim 210 32 and wherein said intermediate layer comprises at least one metal oxide.

34. (Original) A method according to claim 33 and wherein said at least one metallic oxide comprises at least one of the following: chromium oxide, titanium oxide, nickel oxide, lead oxide and tin oxide.

35. (Currently Amended) A method according to claim 210 32 and wherein said intermediate layer comprises a metal.

36. (Currently Amended) A method according to claim 210 32 and wherein said intermediate layer comprises at least one of a nitrogen containing moiety, a sulfur containing moiety and an inorganic hydrogen-containing moiety.

37. (Currently Amended) A method according to claim 210 32 and wherein said intermediate layer comprises at least one of the following chemical groups: sulfhydryl, thiocyanate, thiol, sulfide, disulfide and amine.

38. (Currently Amended) A method according to claim 210 32 and wherein said intermediate layer comprises an organic layer.

39. (Currently Amended) A method according to claim 210 32, and wherein said adsorbing said chemical substance comprises producing at least one of the following interactions between the chemical substance and said plurality of metallic islands: a hydrogen bond, an ionic bond, a covalent bond, a Van der Waals force, an electrostatic force and a physical force.

40. (Currently Amended) A method according to claim 210 32, wherein said transmitting electromagnetic radiation through said plurality of metallic islands comprises transmitting electromagnetic radiation in the ultraviolet/visible/infra-red range.

41. (Currently Amended) A method according to claim 210 32, and wherein said transmitting electromagnetic radiation through said plurality of metallic islands comprises transmitting electromagnetic radiation in the range of 300-1100 nm.

42. (Currently Amended) A method according to claim 210 32, and wherein said transmitting electromagnetic radiation through said chemical substance-metallic islands moiety comprises transmitting electromagnetic radiation in the ultraviolet/visible/infra-red range.

43. (Currently Amended) A method according to claim 210 32, and wherein said transmitting electromagnetic radiation through said chemical substance-metallic islands moiety comprises transmitting electromagnetic radiation in the range of 300-1100 nm.

44. (Currently Amended) A method according to claim 210 32, and wherein said transmitting electromagnetic radiation through said plurality of metallic islands includes transmitting electromagnetic radiation through said transparent substrate comprising at least one of the following: glass, plastic, polystyrene, a polymeric material, an inorganic oxide, quartz and mica.

45. (Currently Amended) A method according to claim 210 32, and wherein said transmitting electromagnetic radiation through said plurality of metallic islands includes transmitting electromagnetic radiation through said transparent substrate having a thickness of up to 5 mm.

46. (Currently Amended) A method according to claim 210 32, and wherein said transmitting electromagnetic radiation through said plurality of metallic islands includes transmitting electromagnetic radiation through metallic islands comprising at least one of the

following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

47. (Original) A method according to claim 210 32, and wherein said metallic islands are gold islands.

48. (Currently Amended) A method according to claim 210 32, and wherein said transmitting electromagnetic radiation through said plurality of metallic islands includes transmitting electromagnetic radiation through metallic islands having a thickness of up to 400 Ångstrom units.

49. (Original) A method according to claim 48, wherein the thickness is between 10 to 100 Ångstrom units.

50. (Cancelled)

51. (Currently Amended) A method according to claim 210 32, and wherein each of said ~~first optical property measurement and said second optical property measurement~~ first and second measurements comprises a peak of maximal absorbance.

52. (Cancelled)

53. (Currently Amended) A method according to claim 210 32, and wherein each of said ~~first optical property measurement and said second optical property measurement~~ first and second measurements comprises an absorbance of said chemical substance-metallic islands moiety at a specific wavelength.

54. (Currently Amended) A method according to claim 210 32, and wherein each of said first ~~generating a first optical property measurement and said generating a second optical property~~

~~measurement~~ first and second measurements comprises performing real-time measurements.

55. (Currently Amended) A method according to claim 210 32, and wherein said employing said first and second measurements comprises comparing ~~said second optical property measurement and said first optical property measurement~~.

56. (Currently Amended) A method according to claim 210 32, and wherein each of said generating a first ~~optical property~~ measurement and said generating a second ~~optical property~~ measurement comprises performing continuous measurements.

57. (Currently Amended) A method according to claim 210 32, and wherein each of said generating a first ~~optical property~~ measurement and said generating a second ~~optical property~~ measurement comprises performing kinetic monitoring.

58. (Currently Amended) A method according to claim 210 32, and further comprising producing the plurality of metallic islands on the transparent substrate.

59. (Previously Presented) A method according to claim 58, and wherein said producing said plurality of metallic islands includes producing said plurality of metallic islands from at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

60. (Previously Presented) A method according to claim 58 and wherein said producing said plurality of metallic islands comprises evaporating said plurality of metallic islands.

61. (Previously Presented) A method according to claim 58 and wherein said producing said plurality of metallic islands comprises sputtering said plurality of metallic islands.

62. (Previously Presented) A method according to claim 58 and wherein said producing

said plurality of metallic islands comprises electroless deposition of said plurality of metallic islands.

63. (Previously Presented) A method according to claim 58 and wherein said producing said plurality of metallic islands comprises electrolytic deposition of said plurality of metallic islands.

64. (Previously Presented) A method according to claim 58 and wherein said producing said plurality of metallic islands comprises hot-melt deposition of said plurality of metallic islands.

65. (Currently Amended) A method according to claim 210 ~~32~~, and further comprising annealing said plurality of metallic islands on said transparent substrate.

66. (Previously Presented) A method according to claim 65, wherein said annealing is performed prior to said adsorbing said chemical substance onto said plurality of metallic islands.

67. (Previously Presented) A method according to claim 65 and wherein said annealing said plurality of metallic islands on said transparent substrate comprises heating said plurality of metallic islands on said transparent substrate for up to 24 hours at up to 400 °C.

68. (Previously Presented) A method according to claim 66 and wherein said annealing said plurality of metallic islands on said transparent substrate comprises heating said plurality of metallic islands on said transparent substrate for up to 4 hours at up to 350 °C.

69-102. (Cancelled)

103 (Currently Amended) Apparatus for analysis comprising:

a first structure substantially transmitting with respect to electromagnetic radiation of a predetermined wavelength range to be measured, said first structure consisting of a transparent substrate carrying a first chemical substance-metallic islands moiety formed by a plurality of spaced-apart metallic islands on the surface of said substrate and the first chemical substance adsorbed to said surface, wherein said first structure has a certain surface plasmon absorption characteristic with respect to said electromagnetic radiation defining a the first structure transmission profile for the wavelength range to be measured, and wherein said first chemical substance is selected to adsorb thereon one or more second chemical substances to form a second chemical substance-first chemical substance-metallic islands moiety on said substrate, thereby enabling formation of a second structure substantially transmitting with respect to said wavelength range and consisting of said substrate carrying the second chemical substance-first chemical substance-metallic islands moiety and having a different surface plasmon absorption characteristic defining a different transmission profile as compared to that of the first structure;

a transmitter configured and operative to transmit the electromagnetic radiation of said predetermined wavelength range through the structure;

a detector oriented with respect to the structure and said transmitter and configured to detect the electromagnetic radiation of said wavelength range transmitted through the structure, and to generate a measurement of the structure transmission profile; and

a processor operative to receive the measurement of the structure transmission profiles, analyze the transmission profiles ~~profile~~ of the structure under measurements, and provide at least one of a quantitative indication and a qualitative indication of at least one of: said first chemical substance-metallic islands moiety, a functionality of said first chemical substance-metallic islands moiety, said plurality of metallic islands, a functionality of said plurality of metallic islands, said first chemical substance and a functionality of said first chemical substance, said second chemical substance-first chemical substance-metallic islands moiety, a functionality of said second chemical substance-metallic islands moiety, said second chemical substance and a functionality of said second chemical substance.

104. (Cancelled)

105. (Original) Apparatus according to claim 103, and wherein said electromagnetic radiation

comprises electromagnetic radiation in the ultraviolet/visible/infra-red range.

106. (Original) Apparatus according to claim 103, and wherein said electromagnetic radiation comprises electromagnetic radiation in the range of 300-1100 nm.

107. (Original) Apparatus according to claim 103, and wherein said transparent substrate includes at least one of the following: glass, plastic, polystyrene, a polymeric material, an inorganic oxide, quartz and mica.

108. (Original) Apparatus according to claim 103, and wherein said transparent substrate has a thickness of up to 5 mm.

109. (Original) Apparatus according to claim 103, and wherein said plurality of metallic islands includes at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

110. (Original) Apparatus according to claim 103, and wherein said metallic islands are gold islands.

111. (Original) Apparatus according to claim 103, and wherein said metallic islands have a thickness of up to 400 Ångstrom units.

112. (Original) Apparatus according to claim 111, and wherein the thickness is between 10 to 100 Ångstrom units.

113. (Cancelled)

114. (Currently Amended) Apparatus according to claim 103, and wherein each of said ~~first optical property measruement and said second optical property measurement~~ first and second

measurements comprises a peak of maximal absorbance.

115. (Cancelled)

116. (Currently Amended) Apparatus according to claim 103, and wherein each of said ~~first optical property measurement and said second optical property measurement~~ first and second measurements comprises an absorbance of said chemical substance-metallic islands moiety at a specific wavelength.

117. (Previously Presented) Apparatus according to claim 103, and wherein said detector is further operative to perform real-time measurements.

118. (Previously Presented) Apparatus according to claim 103, and wherein said processor is further operative to compare said first and second measurements.

119. (Previously Presented) Apparatus according to claim 103, and wherein said detector is further configured to perform continuous measurements.

120. (Previously Presented) Apparatus according to claim 103, and wherein said detector is further configured to perform kinetic monitoring.

121. (Original) Apparatus according to claim 103, and further comprising a metal deposition element operative to produce the plurality of metallic islands on the transparent substrate.

122. (Original) Apparatus according to claim 121, and wherein said metal deposition element is operative to produce said plurality of metallic islands from at least one of the following: gold, silver, copper, titanium, vanadium, chromium, steel, at least one ultra-thin layer of a metal, a binary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium; or a ternary alloy of the following elements: gold, silver, copper, titanium, vanadium, and chromium.

123. (Original) Apparatus according to claim 121 and wherein said metal deposition element is operative to evaporate said plurality of metallic islands.

124. (Original) Apparatus according to claim 121 and wherein said metal deposition element is operative to sputter said plurality of metallic islands.

125. (Original) Apparatus according to claim 121 and wherein said metal deposition element is operative to deposit by electroless deposition said plurality of metallic islands.

126. (Original) Apparatus according to claim 121 and wherein said metal deposition element is operative to deposit by electrolytic deposition said plurality of metallic islands.

127. (Original) Apparatus according to claim 121 and wherein said metal deposition element is operative to deposit by a hot-melt deposition said plurality of metallic islands.

128. (Original) Apparatus according to claim 121, and further comprising a heating element operative to anneal said plurality of metallic islands on said transparent substrate.

129. (Original) Apparatus according to claim 121, and wherein said heating element is operative to heat said plurality of metallic islands for up to 24 hours at up to 400 °C.

130. (Original) Apparatus according to claim 129, and wherein said heating element is operative to heat said plurality of metallic islands for up to 4 hours at up to 350 °C.

131. (Original) Apparatus according to claim 121, and wherein said adsorption enabling element is further configured to enable adsorption of an intermediate layer on said transparent substrate.

132. (Original) Apparatus according to claim 131 and wherein said intermediate layer comprises at least one metal oxide.

133. (Original) Apparatus according to claim 131 and wherein said at least one metallic oxide comprises at least one of the following: chromium oxide, titanium oxide, nickel oxide, lead oxide and tin oxide.

134. (Original) Apparatus according to claim 133 and wherein said intermediate layer comprises a metal.

135. (Original) Apparatus according to claim 131 and wherein said intermediate layer comprises at least one of a nitrogen containing moiety, a sulfur containing moiety and an inorganic hydrogen-containing moiety.

136. (Original) Apparatus according to claim 135 and wherein said intermediate layer comprises at least one of the following chemical groups: sulfhydryl, thiocyanate, thiol, sulfide, disulfide and amine.

137. (Original) Apparatus according to claim 131 and wherein said intermediate layer comprises an organic layer.

138-175. (Cancelled)

176-208. (Cancelled)

Claim 209 (Currently Amended) A sensor device for use in detecting and analyzing at least one predetermined chemical substance by measuring a transmission profile of a structure carrying said predetermined chemical substance, the device comprising:

a first structure substantially transmitting with respect to electromagnetic radiation of a predetermined wavelength range to be measured, the first structure consisting of a transparent substrate carrying a first chemical substance-metallic islands moiety formed by a plurality of spaced-apart metallic islands on the surface of said substrate and the first chemical substance adsorbed to said surface,

wherein said first structure has a first characteristic of a surface plasmon absorption

with respect to said electromagnetic radiation defining a first ~~the~~ structure transmission profile of said electromagnetic radiation, and

wherein said first chemical substance is selected to be capable of adsorbing thereon said at least one predetermined chemical substance;

the device thereby enabling formation of a second structure substantially transmitting with respect to said electromagnetic radiation, the second structure consisting of said substrate carrying the predetermined chemical substance-first chemical substance-metallic islands moiety, and having a second characteristic of a surface plasmon absorption with respect to said electromagnetic radiation defining a second different transmission profile of the second structure, thereby providing the detection of said predetermined substance by detecting a difference in the transmission profile of the second structure as compared to that of the first structure.

210. (New) A method for analysis comprising:

transmitting electromagnetic radiation of a predetermined wavelength range through a first structure substantially transmitting with respect to said electromagnetic radiation, said first structure comprising a plurality of spaced-apart metallic islands on an intermediate layer on a substantially transparent substrate, detecting a transmission of said electromagnetic radiation through said first structure, and generating a first measurement of transmitted radiation indicative of a response of said first structure to said electromagnetic radiation, said first measurement being representative of a surface plasmon absorption of said first structure;

adsorbing a chemical substance onto said plurality of metallic islands so as to produce a second structure substantially transmitting with respect to said electromagnetic radiation and having a second different plasmon absorption characteristic, said second structure comprising a chemical substance-metallic islands moiety on said intermediate layer on said transparent substrate, transmitting the electromagnetic radiation through said second structure, detecting transmission of said second structure to said electromagnetic radiation, and generating a second measurement indicative of a response of said second structure to said electromagnetic radiation, the second measurement being representative of the surface plasmon absorption of said second structure; and

employing said first and second measurement of the surface plasmon absorption of the

first and second structures, respectively, to provide at least one of a quantitative indication and a qualitative indication of at least one of the following: said chemical substance-metallic islands moiety, a functionality of said chemical substance-metallic islands moiety, said plurality of metallic islands, a functionality of said plurality of metallic islands, said chemical substance and a functionality of said chemical substance.

211. (New) A kit for analysis comprising:

a first structure substantially transmitting with respect to electromagnetic radiation of a predetermined wavelength range to be measured, the first structure consisting of a transparent substrate carrying a plurality of spaced-apart metallic islands on the surface of said substrate, wherein said first structure has a first characteristic of a surface plasmon absorption with respect to said electromagnetic radiation defining the structure transmission of said electromagnetic radiation, and wherein said first structure is capable of adsorbing thereon at least one predetermined chemical substance thereby forming a second structure having a second different characteristic of a surface plasmon absorption with respect to said electromagnetic radiation;

a transmitter configured and operative to transmit the electromagnetic radiation of predetermined wavelength range through the structure;

a detector configured to detect the electromagnetic radiation of said wavelength range transmitted through the structure, and to generate a measurement of the structure transmission profile indicative of surface plasmon absorption of the structure; and

a processor operative to receive the measurement, analyze the transmission profile of the structure under measurements provide at least one of a quantitative indication and a qualitative indication of at least one of: said chemical substance-metallic islands moiety, a functionality of said chemical substance-metallic islands moiety, said plurality of metallic islands, a functionality of said plurality of metallic islands, said chemical substance and a functionality of said chemical substance.

212. (New) A sensor device for use in detecting and analyzing at least one chemical substance, the device comprising:

a first structure substantially transmitting with respect to electromagnetic radiation of

a predetermined wavelength range to be measured, the first structure consisting of a transparent substrate carrying a plurality of spaced-apart metallic islands on the transparent substrate; wherein said first structure has a first characteristic of a surface plasmon absorption with respect to said electromagnetic radiation defining the structure transmission of said electromagnetic radiation, and wherein said first structure is capable of adsorbing thereon said at least one chemical substance; thereby enabling formation of a second structure substantially transmitting with respect to said electromagnetic radiation, the second structure consisting of said substrate carrying the chemical substance-metallic islands moiety and having a second characteristic of a surface plasmon absorption with respect to said electromagnetic radiation defining a different transmission profile of the second structure, thereby providing for detecting said chemical substance by detecting a difference in the transmission profile of the second structure as compared to that of the first structure.